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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

<i>Group:</i>	1645	}
		}
<i>Confirmation No.:</i>	3698	}
		}
<i>Application No.:</i>	10/084,638	}
		}
<i>Invention:</i>	COMPOSITIONS OF MULTIMERIC PROFILIN FOR DIAGNOSIS AND TREATMENT OF ALLERGIES	}
		}
<i>Applicant:</i>	Michael Babich.	}
		}
<i>Filed:</i>	February 27, 2002	}
		}
<i>Attorney</i>		}
<i>Docket:</i>	21511/92177	}
		}
<i>Examiner:</i>	Nora M. Rooney	}

RESPONSE TO NOTIFICATION OF NON-COMPLIANT APPEAL BRIEF MAILED SEPTEMBER 11, 2007

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Below is a revised Appeal Brief in support of an appeal taken from the rejection of claims 17, 22-28 in a Final Office Action mailed January 11, 2006, as amended after Final Rejection on June 12, 2006, and entered in the examiner's Advisory Action mailed July 3, 2006. Claim 17 is amended to be identical to the June 12, 2006 submission. Otherwise, the enclosed Appeal Brief is the same as the revised Appeal Brief filed August 22, 2007.

1. **Real Party in Interest.** All rights in this application have been assigned to Immvarx, Inc., a corporation of Illinois whose address is 1009 Johnson Court, Belvidere, Illinois 61008.

2. **Related Appeals and Interferences.** None.

3. **Status of Claims.**

Claims 17, 22-28 are pending.

Claims 1-16, 18-21, 29-33 were withdrawn.

4. **Status of Amendments.** The amendments filed October 17, 2005 and June 12, 2006 were entered according to the Advisory Action mailed July 3, 2006, after which only claims 17, 22-28 are pending.

5. **Summary of Claimed Subject Matter.**

Citations are to pages and lines in the specification as filed.

17. A diagnostic test for allergies (page 4, lines 28-29 to page 5, lines 1-8; page 11, lines 19-31 to page 12, lines 1-2), said test comprising:

- (a) obtaining a pharmaceutical composition of multimeric profilin (page 5, lines 9-16);
- (b) administering the composition to a subject (page 5, lines 12-16); and
- (c) determining a reaction from which allergenicity is inferred (page 5, lines 27-31 to page 6, lines 1-9; FIG. 3; FIG. 4; page 12, lines 23-24; page 13, lines 4-14; page 20, Example 2; page 23, lines 4-28; page 24, lines 1-19).

6. **Grounds of Rejection to be Reviewed on Appeal.**

A. Whether Claims 17, 22-28 are anticipated by U.S. Patent No. 5,583,046 "as evidenced by Vrtala et al." (Advisory Action)

7. **Argument.**

**I. U.S. Pat. No. 5,583,046 (Valenta *et al.*) and Vrtala *et al.*,
do not anticipate the pending claims**

A 35 U.S.C. §102 rejection is not supported because all of the steps recited in claim 17 are not taught by the '046 patent and using the Vrtala reference is improper to cure the deficiencies.

On page 2 of the Action, the examiner rejected claims 17 and 22-28 under 35 U.S.C. §102 (b) as being anticipated by U.S. Pat. No. 5,583,046 (Valenta *et al.*), "as evidenced by Vrtala *et al.*" The examiner has not established a legally sufficient basis for a 102 (b) rejection because neither Valenta *et al.* nor Vrtala *et al.* either singly or in combination teach all the claimed elements as required to anticipate. In addition, there is no justification for adding Vrtala to what should be a rejection based on a single case. Such a combination is an improper and an incorrect basis for an anticipation rejection. To stretch beyond one reference, the omitted element must be recognized in the art. The examiner has not demonstrated recognition of multimeric profilin as a hyposensitizing agent. Even if combined, the combination still does not teach all the elements of the pending claims. The examiner's sole reasoning in support of using Vrtala to fill in the admitted deficiencies in Valenta, is as follows:

Vrtala recognized that when Betv2 is placed in solution it naturally polymerizes. The Vrtala *et al.*, reference is only relied upon to characterize an already described process.

Office Action, page 2.

The examiner does not identify what "solution" in Valenta or in the pending application are being compared. There is no proof of an "already described process" that is the same as the claimed process.

A. Valenta does not teach the claimed elements

To anticipate, a **single reference must teach all the elements** of the claims. *RCA Corp v. Applied Digital Data Sys., Inc.*, 221 USPQ 385, 388 (Fed. Cir. 1984). An anticipating prior art reference should disclose **each and every limitation** of the claim expressly or inherently. *Akamai Techs. v. Cable & Wireless Internet Servs.*, 344 F.3d 1186, 1192 (Fed.

Cir. 2003). To anticipate a claim, a reference must **disclose every element of the challenged claim and enable** one skilled in the art to make the anticipating subject matter. *PPG Industries, Inc. v. Guardian Industries Corp.*, 75 F.3d 1558, 1566, 37 USPQ2d 1618, 1624 (Fed. Cir. 1996). (*emphases added*).

By the examiner's own admission, the '046 (Valenta) patent does not anticipate. The examiner admits that "Claim 17 requires....administering a multimeric profilin" and also admits "The '046 patent.... is silent as to whether Betv2 is multimeric."

As the examiner admits, the '046 patent does not disclose all the claim elements. For example, '046 does not disclose or even suggest the use of a multimeric profilin to hyposensitize a mammal. The '046 patent merely discloses a synthetic version of a 14 kDa birch pollen antigen P14:

The present invention provides **recombinant DNA molecules** which contain a nucleotide sequence that codes for a polypeptide which exhibits the same or similar antigenic properties as a natural allergen, P14,... (Col. 2, Ins. 14-17)

The present invention covers the use of **P14 synthetic polypeptide** allergens to hyposensitize or desensitize a mammal. Such polypeptides can be administered to a human subject either alone or in combination with pharmaceutically acceptable carriers or diluents, in accordance with standard pharmaceutical practice. (Col. 11, Ins. 34-40)

In contrast, the claims of the present application are based, in part, on the increased IgE recognition of profilin multimers, singular fragments based on the sequence that uniquely may arise, or be exposed, upon profilin polymerization that are not available in the monomeric parent molecules. This may reflect one or more novel amino acid sequences that are comprised of part of each of at least two monomers complexed together to form the polymer, or a sequence that is buried within the tertiary monomeric structure that becomes exposed upon multimerization with one or more additional profilins. Such fragments are not dependent upon whether a portion of IgE epitope(s) is present or not. The novel polymers of the present invention takes advantage of native configurations/structural phenomenon that lead to the pan-allergenic potential (not taught in the '046 patent) that, in turn, may be used for diagnostic and therapeutic use to induce a hypoallergenic response.

B. The examiner has not countered applicant's assertion that Vrtala teaches away from the claimed invention

According to the examiner, Claim 17 requires an *in vivo* diagnostic test comprising administering a multimeric profilin molecule. "The '046 patent teaches administering Bet v2, a profilin. The reference is silent as to whether Bet v2 is multimeric." The examiner added Vrtala because of the statement that when rBet v2 is placed in solution, it naturally polymerizes.

There is no teaching in the '046 patent that when Bet v2 is placed in solution, as required to administer to a subject in non-lyophilized form, it polymerizes due to the physical properties of the molecule. The Vrtala reference teaches on page 914 "it could be shown that rBet v2 formed polymers through disulfide bonds" and that "The tendency of recombinant Bet v 2 to form polymers through disulfide bonds under non-reducing conditions was demonstrated by SDS-PAGE, immunoblotting and blot overlays. The examiner's position is that "this reference has been used simply to illustrate an already described process showing inherent properties of the molecule."

Vrtala **teaches against** the present invention. For example, on page 914, left column, Vrtala states the following:

It could be shown that rBet v2 formed polymers through disulfide bonds, and it is hence suggested that the **decreased allergenicity of rBet v 2 might be related to its tendency to polymerize.** (emphasis added)

On page 920, left column, Vrtala further states the following:

[a]nd it is hence possible that the **weaker capacity** of rBet v 2 to induce IgE antibodies might be linked to the ability to form natural **polymers through disulfide bonds**. Although it must be stressed that there is currently no feasible experimental data suggesting that polymerization of antigens might be a mechanism with which to reduce the allergenicity of protein antigens in favor of a TH1 response. (emphasis added)

Therefore, Vrtala teaches away from the present invention which claims profilin multimers result in **increased** allergenicity. The utility of profilin multimers was not

recognized in the references cited by the examiner nor are there arguments presented to pinpoint where in solutions of the publication multimeric profilin is formed, and to equate such multimers to those in the present claims.

Vrtala et al. did not find utility for profilin multimers in allergy diagnostics nor therapeutics; they state the opposite.

Their experimental approach does not indicate that profilin multimers would be more allergenic/antigenic and yield possible unique epitopes (upon multimerizing) that could be used as a basis to develop profilin multimer-based diagnostics and immunotherapeutics:

- 1) The form Vrtala injected into the animal models is not clear, but likely is a monomeric form. Conditions to make a soluble form were followed that would produce mostly monomeric profilin (in Methods: "The recombinant protein produced a single peak in the chromatogram obtained by high-pressure liquid chromatography and was completely soluble").
- 2) Production of a monomeric form (displayed in Figures 1 and 2) for injection is consistent with the production in animal models of monomeric-recognizing IgG and IgE (lesser degree) shown in Figure 3. Indeed, there were no noted antibodies that recognized the larger profilin forms.
- 3) 20x of the profilin (Bet v2) was required vs. Bet v1 : Vrtala's assumption is because it's due to "some intrinsic property", but "there is currently no feasible experimental model to definitively prove this hypothesis" (page 920, last paragraph).

Considering information in the present application, the reason 20x more of Bet v2 profilin vs. Bet v1 was needed by Vrtala to elicit a response was because the injected solution contained monomers (i.e., weaker allergen/antigen) or undetectably small amounts of multimers such that a high concentration was needed to achieve an immune response.

Vrtala teaches away from the claimed invention. The form of rBet v2 injected into the animal models was likely monomeric. On page 914 in the Vrtala Methods section relied upon by applicant for this assertion, "the recombinant protein produced a single peak in the chromatogram" refers to the rBet v1 protein. There is not contrary data for rBet v2.

Therefore, Vrtala further illustrates contrasting conclusions to the present invention about the use of profilin multimers in diagnostics and therapeutics. The utility of profilin polymers was not recognized nor was it obvious that the profilin polymers would be a key allergen.

8. **Claims Appendix.**

See attached.

9. **Evidence Appendix.**

See attached.

10. **Related Proceedings Appendix.**

None

* * *

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "Alice O. Martin". The signature is fluid and cursive, with the first name "Alice" being the most prominent.

Alice O. Martin
Registration No. 35,601

Dated: October 11, 2007
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8. Claims Appendix

17. A diagnostic test for allergies, said test comprising:

- (a) obtaining a pharmaceutical composition of multimeric profilin;
- (b) administering the composition to a subject; and
- (c) determining a reaction from which allergenicity is inferred.

22. The method of claim 17, wherein multimeric profilin is selected from a group consisting of naturally occurring, synthetic, or recombinantly made profilin.

23. The diagnostic test of claim 17, wherein the profilin occurs as complexes of homomultimers.

24. The diagnostic test of claim 17, wherein the multimeric profilin comprises synthetic peptide fragments of profilin.

25. The diagnostic test of claim 24, wherein the multimeric profilin comprises synthetic peptide fragments that arise from profilin multimerization.

26. The diagnostic test of claim 17, wherein the multimeric profilin comprises peptide fragments made by recombinant DNA technology.

27. The diagnostic test of claim 17, wherein the multimeric profilin comprises monomers selected from the group consisting of celery (Api g4, GENE BANK ACCESSION NO. QPXF37) (SEQ ID NO: 1), peanut (Ara h5, GENE BANK ACCESSION NO. Q9SQ19) (SEQ ID NO: 2), birch tree pollen (Bet v2, GENE BANK ACCESSION NO. P25816) (SEQ ID NO: 3), Bermuda grass (Cyn d12, GENE BANK ACCESSION NO. 004725) (SEQ ID NO: 4), soybean (Gly m3, GENE BANK ACCESSION NO. 065809) (SEQ ID NO: 5), 065810 (SEQ ID NO: 6)), sunflower (Hel A2, GENE BANK ACCESSION NO. 081980) (SEQ ID NO: 7), latex (Hev b8, GENE BANK ACCESSION NO. CAB51914) (SEQ ID NO: 8), 065812 (SEQ ID NO: 9), Q9STB6 (SEQ ID NO: 10), Q9M7NO (SEQ ID NO: 11), Q9M7M9 (SEQ ID NO: 12), Q9M7M8 (SEQ ID NO: 13), Q9LE18 (SEQ ID NO: 14)), Mercurialis annua (Mer al, GENE BANK ACCESSION NO. 049894) (SEQ ID NO: 15), olive tree pollen (Ole e2, GENE BANK ACCESSION NO. P19963) (SEQ ID NO: 16), 0024170m (SEQ ID NO: 17) 024171 (SEQ ID NO: 18)), timothy grass (Phl pl 1, GENE BANK ACCESSION NO. P35079) (SEQ ID NO: 19), 024650 (SEQ ID NO: 20), 024282 (SEQ ID NO: 21)), sweet cherry (Pru av4, GENE BANK ACCESSION NO. Q9XF39) (SEQ ID NO: 22)), pear (Pyr c4, Q9XF27 (SEQ ID NO: 23)), corn

pollen (Zea Pro I, GENE BANK ACCESSION NO.B35081 (SEQ ID NO: 24); Zea Pro II, GENE BANK ACCESSION NO. P35080 (SEQ ID NO: 25); ZMPro III, GENE BANK ACCESSION NO. P35083 (SEQ ID NO: 26); ZmProIV, GENE BANK ACCESSION NO. 022655 (SEQ ID NO: 27); ZmProV, GENE BANK ACCESSION NO. Q9FR39 (SEQ ID NO: 28)), human (profilin I, GENE BANK ACCESSION NO. P07737 (SEQ ID NO: 29); Profilin II isoform 1, GENE BANK ACCESSION NO. NP_444252 (SEQ ID NO: 30); and Profilin II isoform GENE BANK ACCESSION NO._NP 002619 (SEQ ID NO: 31), or combinations thereof.

28. The diagnostic test of claim 17, wherein the composition comprises pharmaceutically acceptable carriers or diluents.

9. Evidence Appendix

Susanne Vrtala, *Induction of IgE Antibodies in Mice and Rhesus Monkeys with Recombinant Birch Pollen Allergins: Different Allergenicity of Bet v 1 and Bet v 2* (J Allergy Clin Immunol, Vol. 98, No. 5, Part 1 1996)

U.S. Patent No. 5,583,046 *Birch Pollen Allergen P14 for Diagnosis and Therapy of Allergic Diseases* (Issued December 10, 1996)

10. Related Proceedings Appendix

None.